Claims

We claim:

1. A method of cooling at least one heat-generating device using a cooling system, the method comprising the steps of:
using at least one pump to cause a fluid to flow in at least one heat exchanger; and
adjusting a pressure of the fluid to correspondingly adjust a boiling point temperature of the fluid in the at least one heat exchanger.

2. The method of claim 1, wherein the step of adjusting a pressure of the fluid comprises adjusting operating conditions of the at least one pump in response to at least one of:
changes in pressure of the fluid;
changes in temperature of the fluid;
changes in temperature of the at least one heat-generating device; and
changes in temperature of the at least one heat exchanger.

3. The method of claim 1, wherein the step of adjusting a pressure of the fluid comprises adjusting an orifice coupled to the at least one heat exchanger in response to at least one of:
changes in pressure of the fluid;
changes in temperature of the fluid;
changes in temperature of the at least one heat-generating device; and
changes in temperature of the at least one heat exchanger.

4. The method of claim 1, wherein the method further comprises the step of: providing at least one heat rejector for rejecting heat from the system to ambient air, the at least one

heat rejector being situated downstream of the at least one heat exchanger.

5. The method of claim 4, wherein the method further comprises the step of providing a reservoir that accommodates a larger volume of a gas in the system generated during boiling.

6. The method of claim 5, wherein the reservoir reduces a change in pressure of the fluid that occurs during boiling.

7. The method of claim 5, wherein the reservoir is situated downstream of the at least one heat rejector..

8. The method of claim 5, wherein the reservoir is situated upstream of the at least one heat rejector.

9. The method of claim 5, wherein the reservoir having a volume region as great as the volume of vapor generated by the at least one heat exchanger during boiling of the fluid.

10. The method of claim 5, wherein the reservoir having an inlet coupled to a fluid outlet port of the at least one heat rejector via a first portion of a fluid transport line and an outlet coupled to a fluid inlet port of the at least one pump via a second portion of the fluid transport line.

11. The method of claim 5, wherein the reservoir is integrated with one of the at least one heat rejector and the at least one pump.

12. The method of claim 1, wherein the system is hermetically sealed.

13. The method of claim 12, wherein the hermetically sealed refers to a design in which the pressure under a given set of pump, ambient temperature, and heating conditions varies by less than 1 psi during a five year lifetime.

14. The method of claim 1, wherein the fluid is selected from a group consisting of water, acetonitrile, acetone, N-methylformamide, benzene, ethanol, methanol, and a combination thereof.

15. The method of claim 1, wherein the fluid comprises a halocarbon.

16. The method of claim 15, wherein the halocarbon is a methane series halocarbon selected from the group consisting of trichlorofluoromethane and trifluoromethane.

17. The method of claim 15, wherein the halocarbon is a ethane series halocarbon comprising pentafluoroethane (R-125).

18. The method of claim 1, wherein the fluid is a zeotropic blend comprising R-404A.

19. The method of claim 1, wherein the fluid is an azeotropic blend selected from the group consisting of R-500 and R-502.

20. The method of claim 1, wherein the fluid is inorganic.

21. The method of claim 20, wherein the inorganic is selected from the group consisting of ammonia and carbon dioxide.

22. The method of claim 1, wherein the fluid comprises a hydrocarbon.

23. The method of claim 22, wherein the hydrocarbon is selected from the group consisting of methane, ethane, propane, n-butane, 2-methylpropane, isobutane, ethene, ethylene, propene, propylene, and combinations thereof.

24. The method of claim 1, wherein the fluid is cryogenic.

25. The method of claim 24, wherein the cryogenic is selected from the group consisting of hydrogen, parahydrogen, helium, nitrogen, neon, air, oxygen, argon, and combinations thereof.

26. The method of claim 1, wherein the fluid is selected from the group consisting of water, acetonitrile, acetone, N-methylformamide, benzene, ethanol, methanol, halocarbons, zeotropic blends, azeotropic blends, inorganic fluids, hydrocarbons, cryogenic fluids, and mixtures thereof, the halocarbons being methane series halocarbons selected from the group consisting of trichlorofluoromethane, trifluoromethane and mixtures thereof, the zeotropic blends comprising R-404A, the azeotropic blends being selected from the group consisting of R-500, R-502 and mixtures thereof, the inorganic fluids being selected from the group of ammonia, carbon dioxide and mixtures thereof, the hydrocarbons being selected from the group consisting of methane, ethane, propane, n-butane, 2-methylpropane, isobutane, ethene, ethylene, propene, propylene and mixtures thereof, the cryogenic fluids being selected from the group consisting of hydrogen, parahydrogen, helium, nitrogen, neon, air, oxygen, argon and mixtures thereof.

27. The method of claim 1, wherein the method further comprises the step of: providing sensors to adjust the fluid flow from the at least one pump.

28. The method of claim 27, wherein the sensors being coupled to the at least one heat exchanger.

29. The method of claim 1, wherein the at least one pump is electro-osmotic.

30. The method of claim 1, further comprising the step of: delivering to a catalytic recombiner a gaseous stream containing hydrogen being discharged from a downstream side of the at least one pump together with an amount of oxygen generated from an upstream side of the at least one pump sufficient to convert the hydrogen and oxygen to water, the catalytic recombiner coupled to an inlet port of the at least one pump.

31. The method of claim 1, wherein the step of adjusting a pressure of the fluid comprises adjusting the pressure of the fluid during a charging and sealing of the system.

32. The method of claim 1, wherein the step of adjusting a pressure of the fluid comprises adjusting at least one of a composition and volume and combinations thereof of at least one of a gas and liquid and combinations thereof introduced during charging of the system.